

Supreme Allied Commander Transformation



TIDE

Transforming towards
Information superiority
Decision superiority and
Execution superiority

NATO Service Oriented Architectures (SOA) Best Practices

TIDE Strategies

- Create a cooperative climate between stakeholders (“the sandbox”) for horizontal and vertical integration of functional services breaking down traditional stovepipe barriers
- Assist in developing a network enabled architecture facilitating global deployment, alliance/coalition interoperability and plug & play reconfiguration
- Rapidly improve operational information system capabilities like COP and collaboration through spiral development, experimentation and technology insertion
- Improve integration of automated and human processes through capability component harmonization and cognitive science experimentation

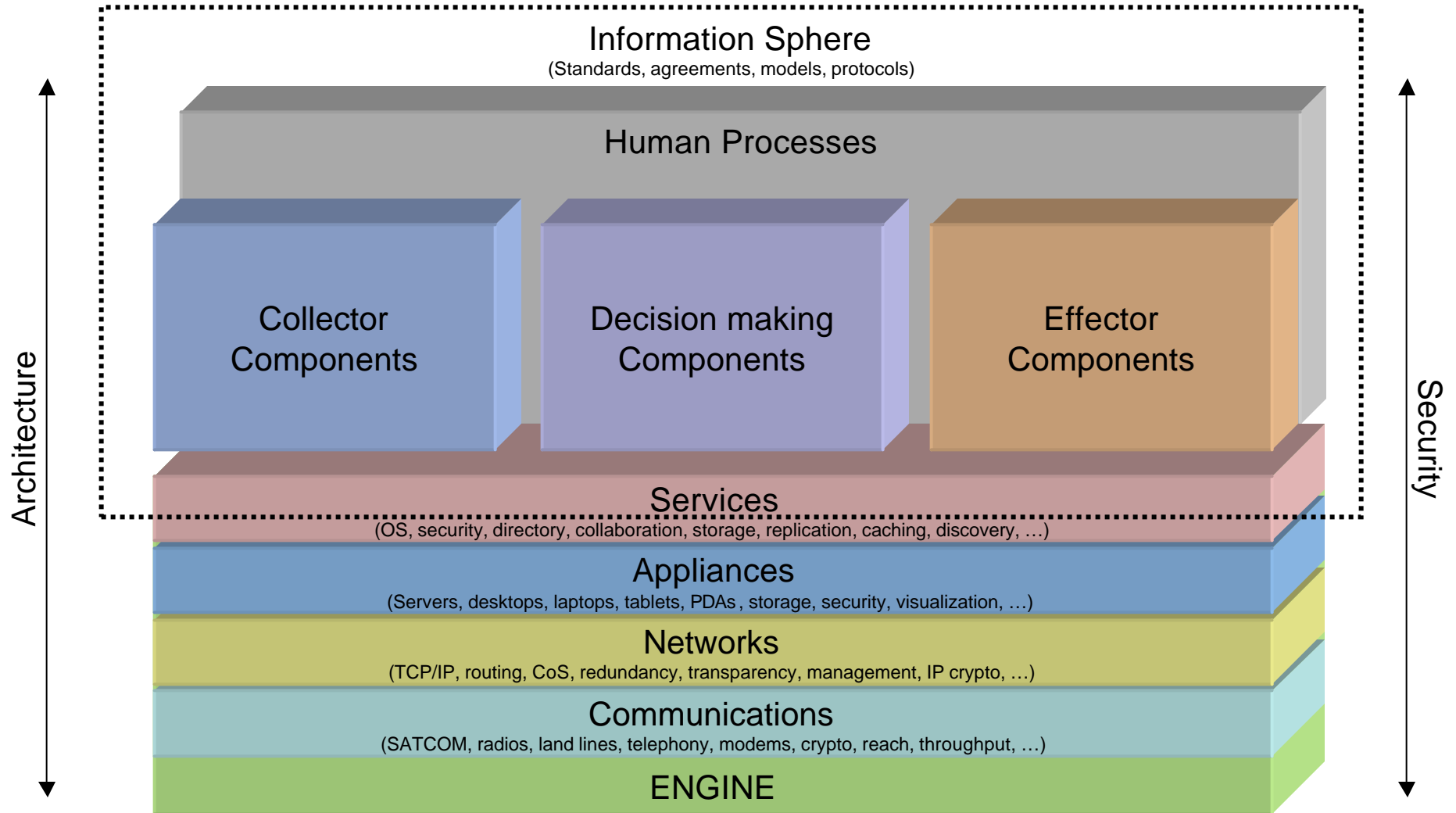
TIDE Principles ⁽¹⁾

- Reuse existing NATO/National systems, services and components in a network enabled environment based on best of breed integration
- Use evolutionary methodologies to fill identified gaps
- Evaluate effectiveness of proposed enhancement during experimentation opportunities and exercises

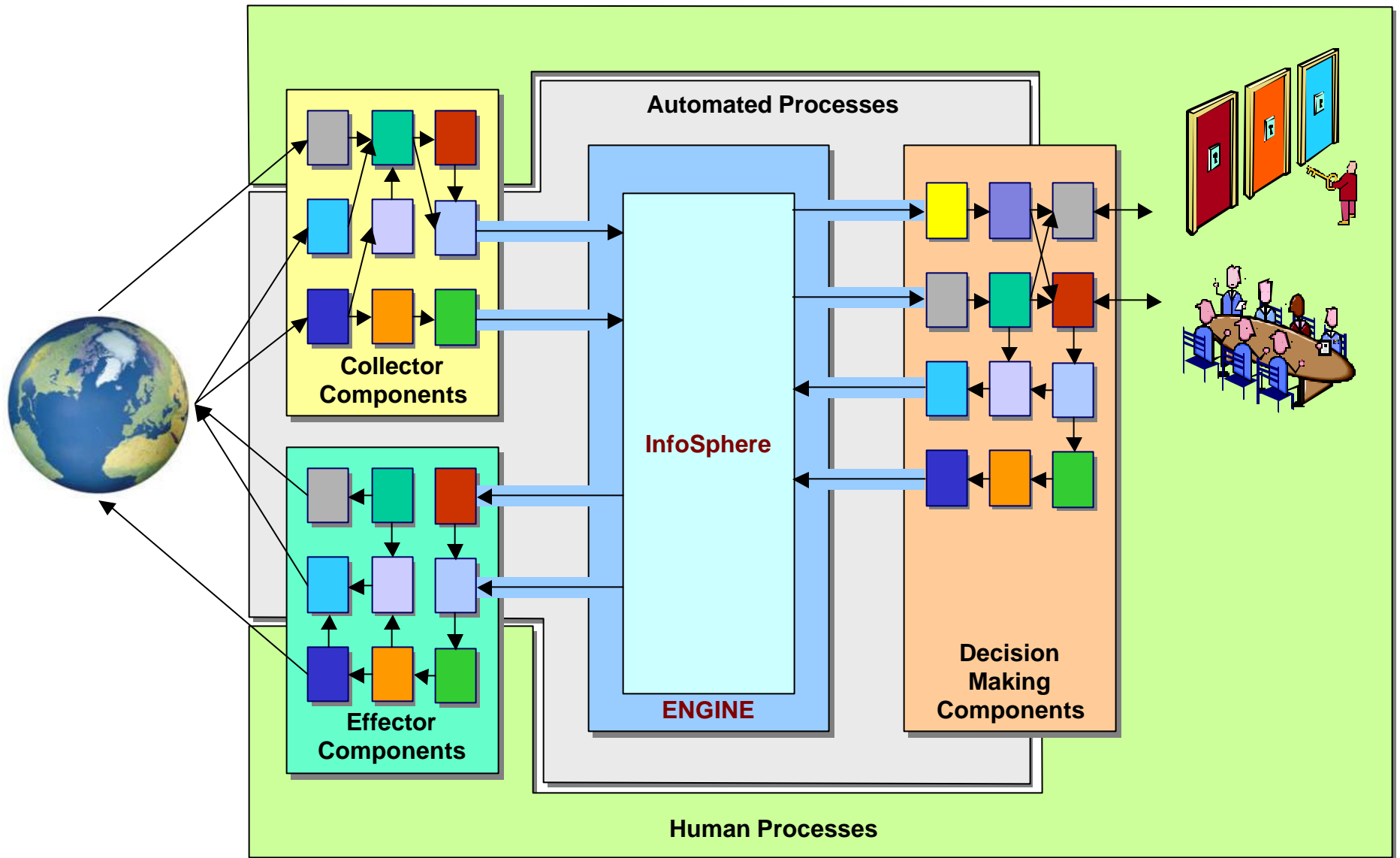
TIDE Principles (2)

- Maximize interoperability with Nations, International organizations and NGOs
- Deploy component based architecture facilitating fast reconfiguration for any environment and to counter any threat
- Evaluate automatic discovery and integration technologies promoting loose coupling between systems and components

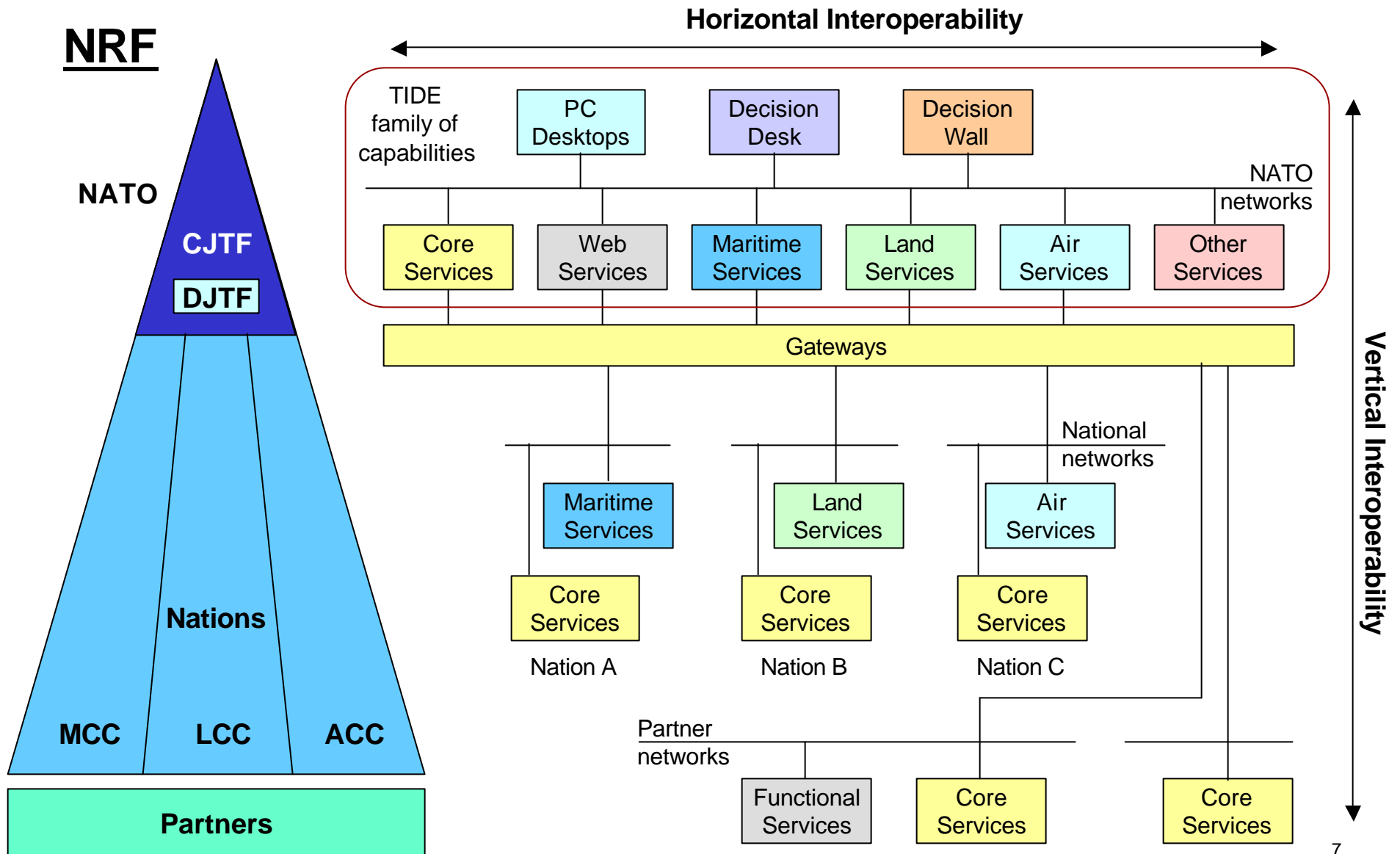
TIDE Conceptual Framework



TIDE Conceptual Flow

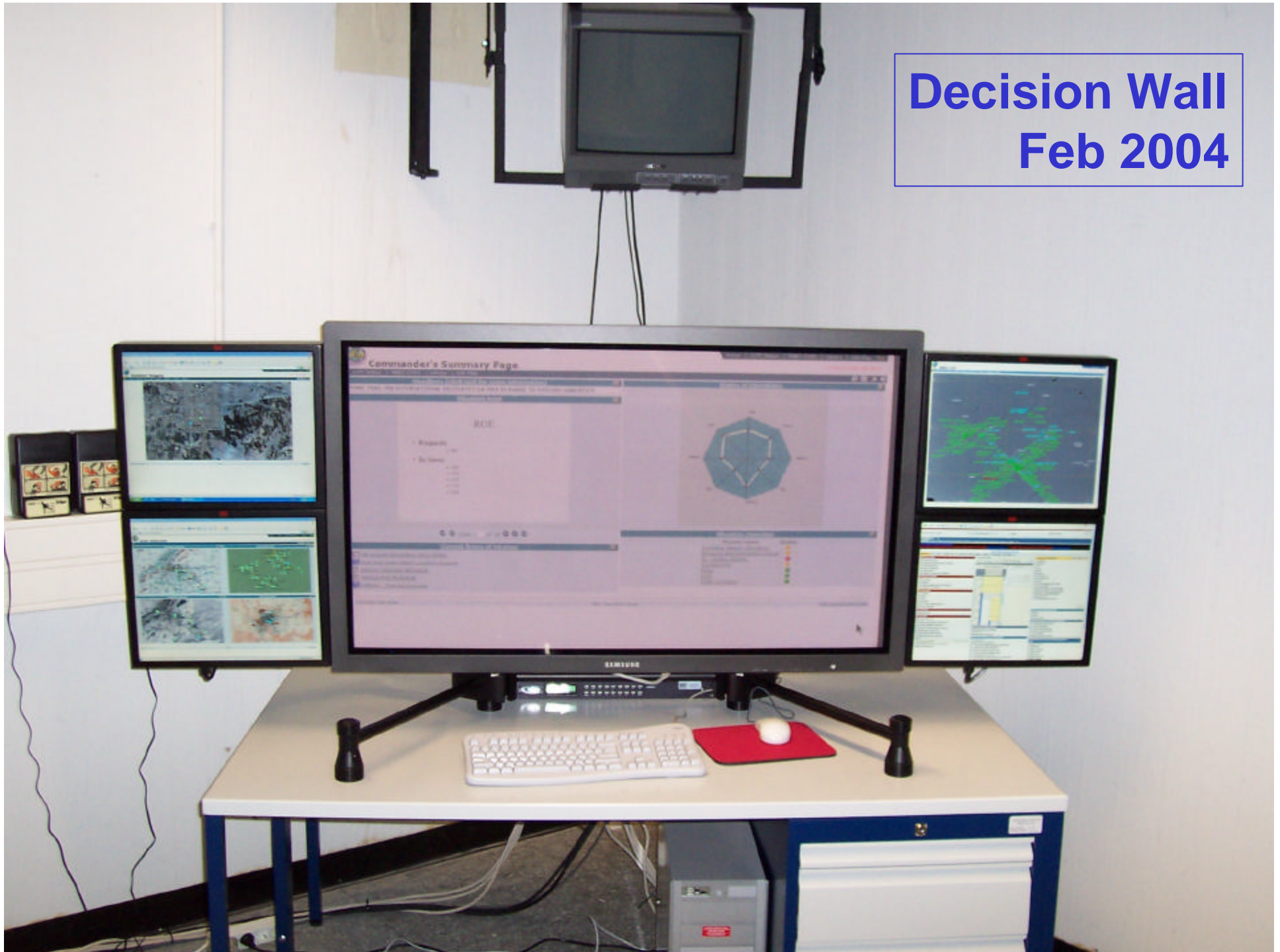


TIDE Experimentation



Decision Wall

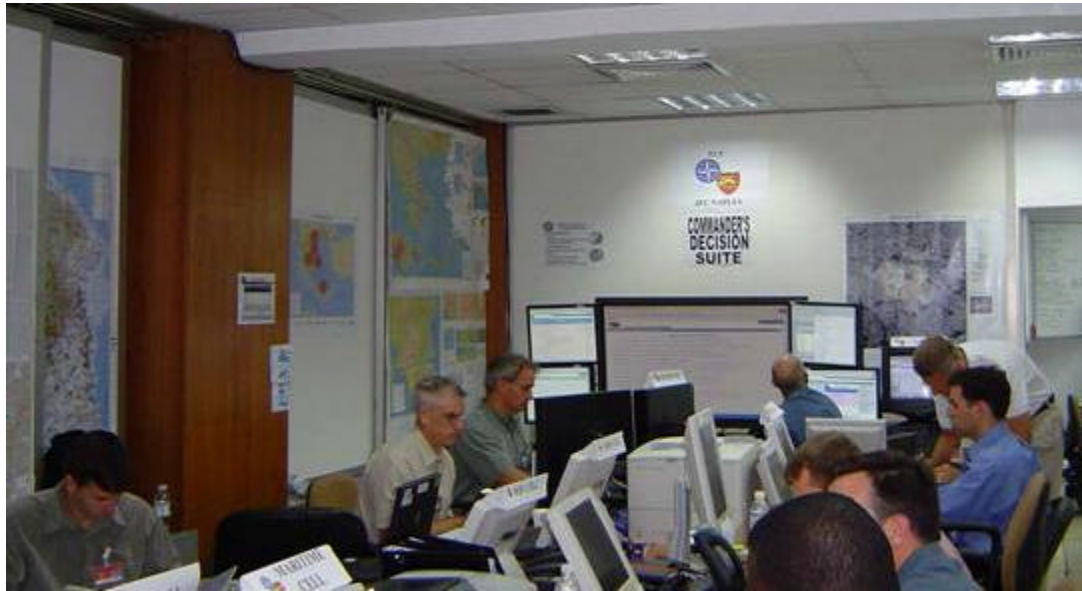
Feb 2004



Allied Action 2004 - Decision Wall



Operation Distinguished Games 2004



Providing...

- A land and maritime fused operational picture
- A common air picture
- A running event log
- The CJTF homepage playing latest brief in sequence

...but highly flexible, and able to

- Overlay geo and satellite images with COP data
- Pull information feeds from across the NATO network
- Be rapidly reconfigured to respond to commander's information requirements



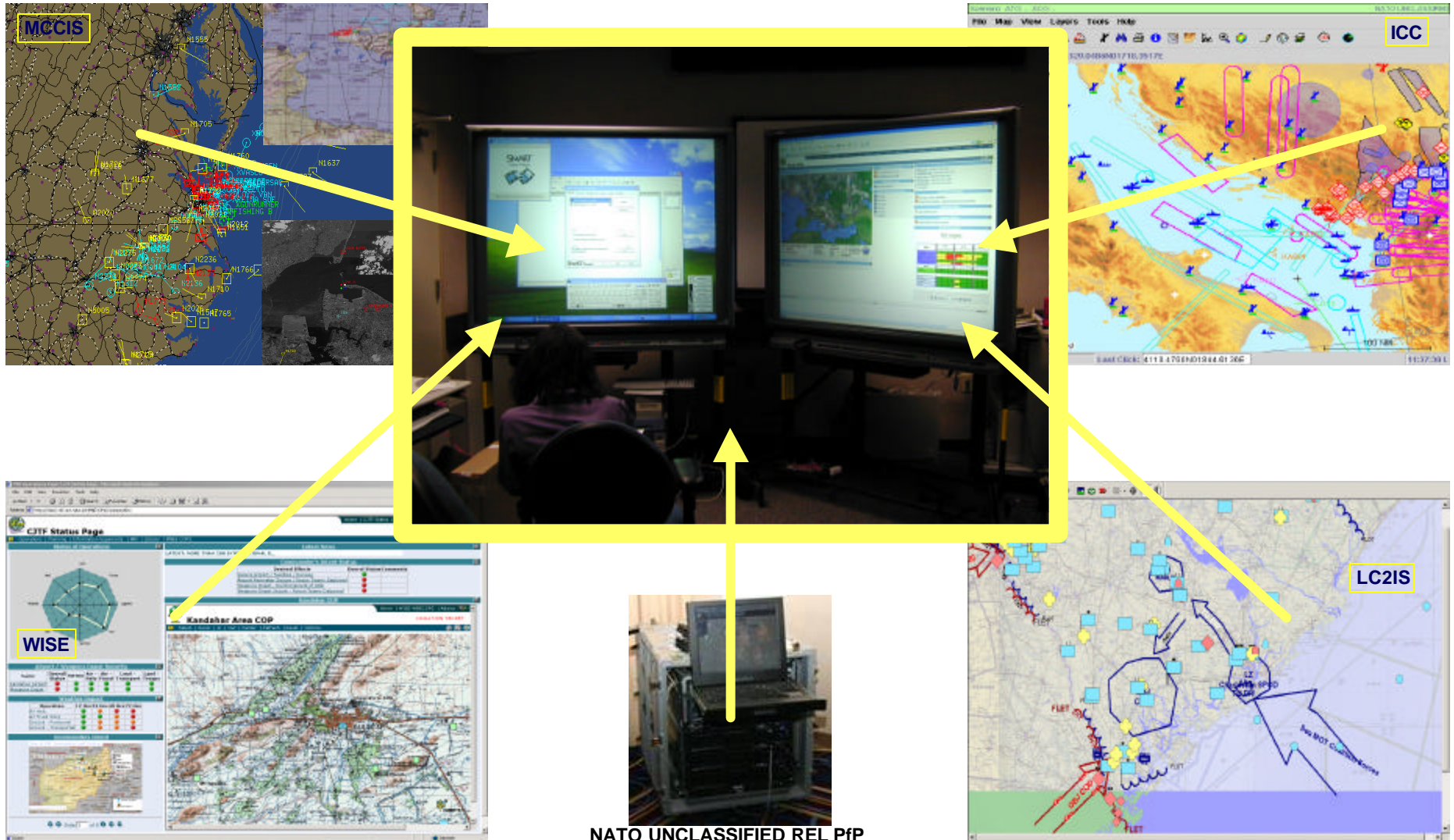
Interactive Decision Wall



So what is transformational about the Decision Wall?

- Isn't it just a bunch of old technologies connected to a big television?
- Yes, it is!
- But by connecting small but powerful components in innovative ways, a capability multiplier effect is achieved in a network enabled environment

Component Based Architectures



Composable Applications

- Collector, decision maker and effector applications must be flexible, self-managing, component based services
- Lower level components must be reusable to compose other applications
- Composable applications must be based on a platform neutral, multi-tier, component architecture
- Composable applications must support automatic discovery and integration

SOA Best Practices (ZAPThink.com)

- Develop a top-down, extended enterprise SOA
- Build & maintain a platform independent Service model
- Maintain feedback at all points of the architecture
- Follow Agile Methodology principles & techniques within the context of the Service model
- Encapsulate existing/legacy functionality
- Embrace heterogeneity/follow a federation model of software
- Compose atomic Services into coarse-grained business Services
- Build for consumability/broad applicability
- Perform ad hoc upgrades
- Prioritize SOA transition activities on the fly

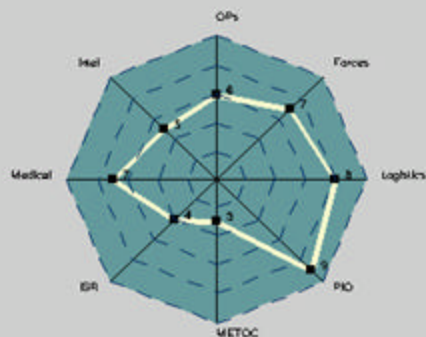


CJTF Status Page

Operations | Planning | Information Superiority | NRF | Library | MNE3 COPS

Home | CJTF Status | MNE3 COPS | Library | Site Map

Status of Operations



Latest News

LATEST: MORE THAN 200 INTERNATIONAL D_

Commander's Intent Status

Desired Effects	Overall Status	Comments
Secure Airport / Facilities / Runway	Green	
Airport Perimeter Secure / Recon Teams Deployed	Red	
Weapons Depot - Reinforcement of ANA	Red	
Weapons Depot Secure - Recon Teams Deployed	Red	

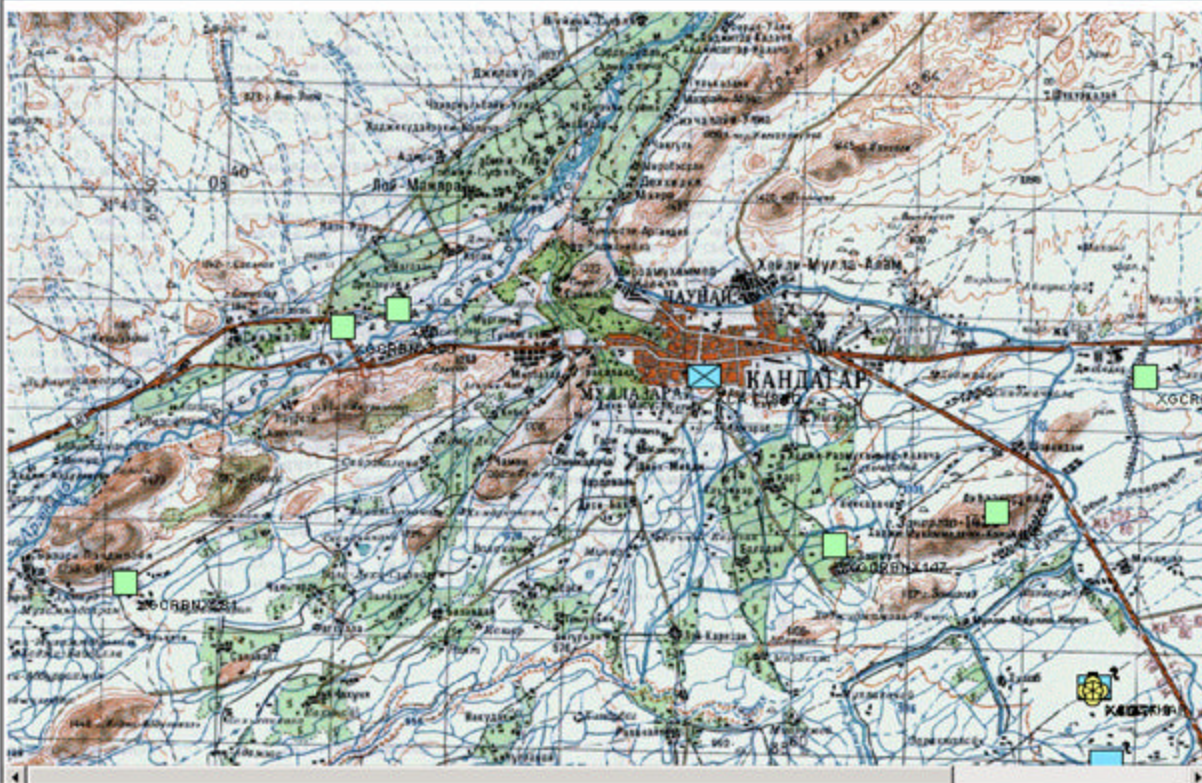
Kandahar COP

Home | WISE WEBCOPS | Adams



Kandahar Area COP

Select | Zoom | In | Out | Center | Refresh | Reset | Options



Airport / Weapons Depot Security

Name	Overall Status	METOC	Air - Helo	Air - Fixed	Land - Transport	Land - Troops
Kandahar Airport	Red	Green	Green	Green	Green	Green
Weapons Depot	Red	Green	Green	Green	Green	Green

Weather Impact

Operation	12 Hrs	24 Hrs	48 Hrs	72 Hrs
Air Helo	Green	Orange	Red	Red
Air Fixed Wing	Green	Green	Orange	Red
Ground - Personnel	Green	Orange	Orange	Red
Ground - Transport	Green	Orange	Orange	Red

Commanders Intent



Slide 3 of 8

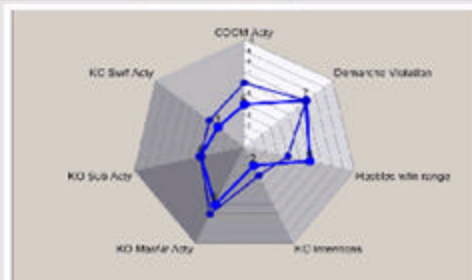


SJF-HQ Operational Site

NATO UNCLASSIFIED

Intel | CTF | Metoc | Logistics | NATO Response Force | Missions | ONA | UN Reports and Resolutions

Overall Status



Counter drugs



Current OPS

Operation	Mission Status	Sorties	Supplies	Troop Readiness
Red Dog	●	◆	■	▲
Evade	●	◆	■	▲
Ferret	●	◆	■	▲
Force Protect	●	◆	■	▲

COP



Desktop Collaboration

File Edit View Actions Help

To: emmie banks
<banks@act.nato.int>

ACT INSTANT MESSAGING

You have asked to have a video and voice conversation with emmie banks. Please wait for a response or Cancel (Alt+Q) the pending invitation.

emmie banks has accepted your request to have a video and voice conversation.

Stop Camera

Stop Talking

Speakers

Microphone

LIVE CNN Feed

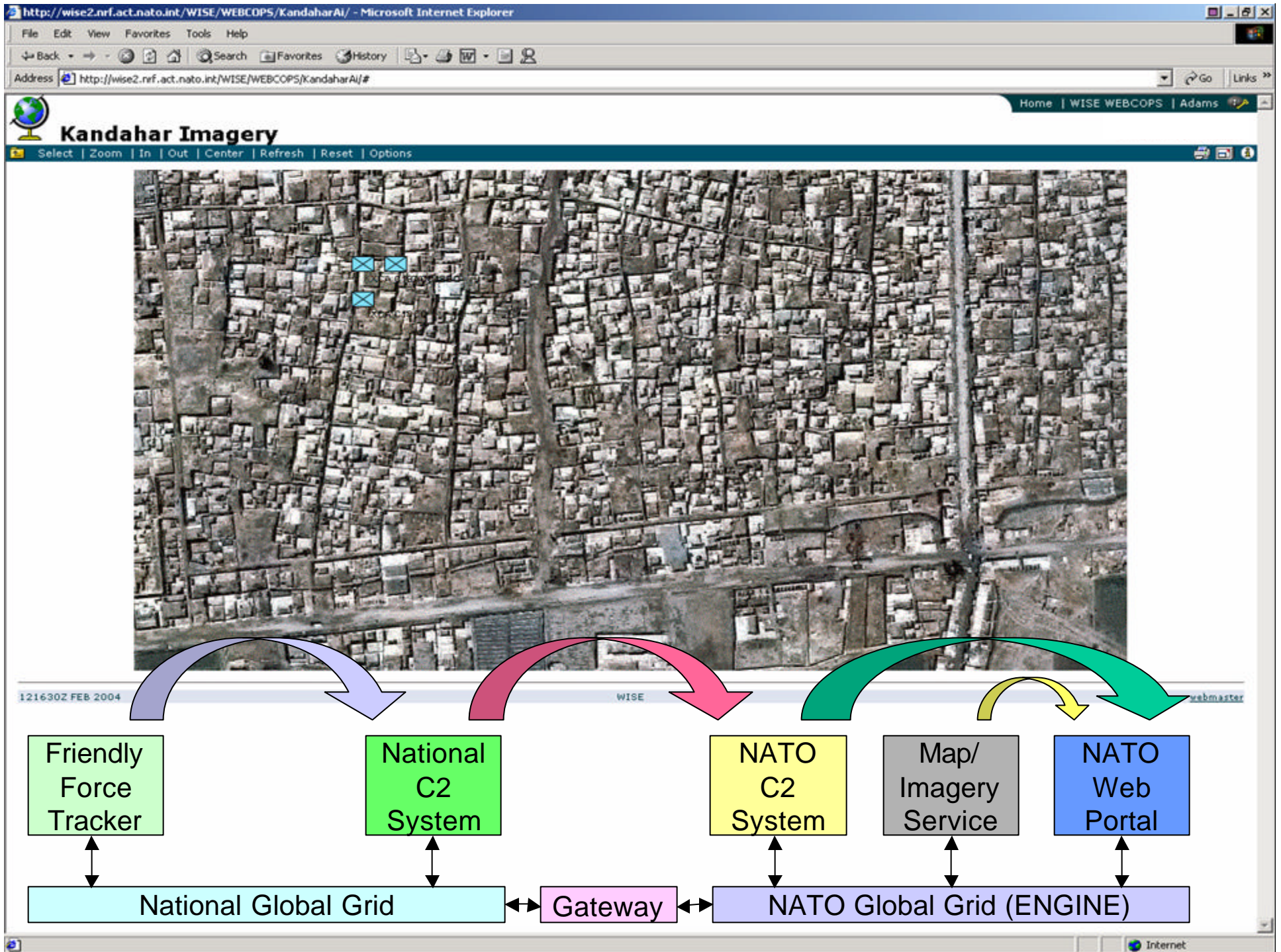


Weather Concerns



Weather Impact

Operation	12 Hrs	24 Hrs	48 Hrs	72 Hrs
Air Helo	●	●	●	●
Air Fixed Wing	●	●	●	●
Ground - Personnel	●	●	●	●
Ground - Transport	●	●	●	●



Experimentation Purpose

- Prove/disprove transformational hypothesis during technical and operational experimentation events
- Possible outcomes:
 - Hypothesis is proven wrong ->
 - Abandon experiment and file under lessons learned
 - Hypothesis has potential but needs refinement ->
 - Refine hypothesis or solution and reschedule
 - Hypothesis is proven right ->
 - Quickly transition solution to capability managers for operational fielding

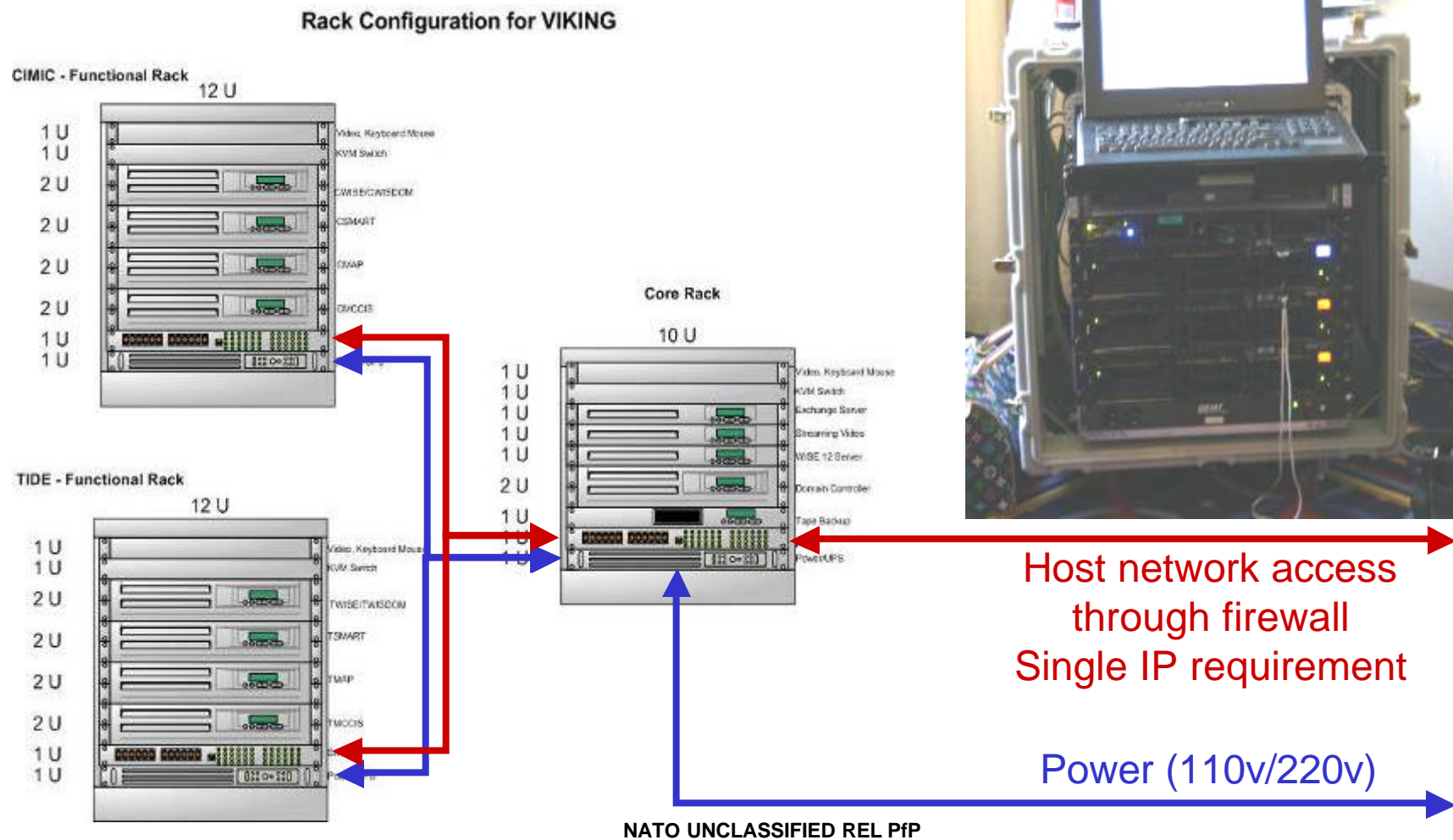
TIDE Experimentation Focus

- Scalable mobile server clusters
- Improved human computer interfaces
- Scalable plug & play architectures
- Automatic discovery and integration
- Simple yet effective web interfaces
- Component based functional services
- Interoperability with partners

Hypothesis 1: Mobile IT

- To support rapid reaction forces, it is important that information technology services are highly mobile, scaleable, robust, easy to install and exhibit plug & play properties
- We can build a server cluster consisting of a number of mobile racks tied together in such a way that the requirements on the host network are limited 1 power plug, 1 network drop and a single IP address

Mobile Server Cluster Example



Hypothesis 2: Improved SA

- Unambiguous joint and combined situational awareness (resulting from improved information superiority) is a key prerequisite in achieving decision superiority
- We can build a better Common Operational Picture (COP) by reusing NATO's existing capabilities in more innovative ways
- We can deploy emerging commercial standards to support automatic information discovery and semantic linking between related information

Improved SA/COP at CWID 2005

■ **The Players**

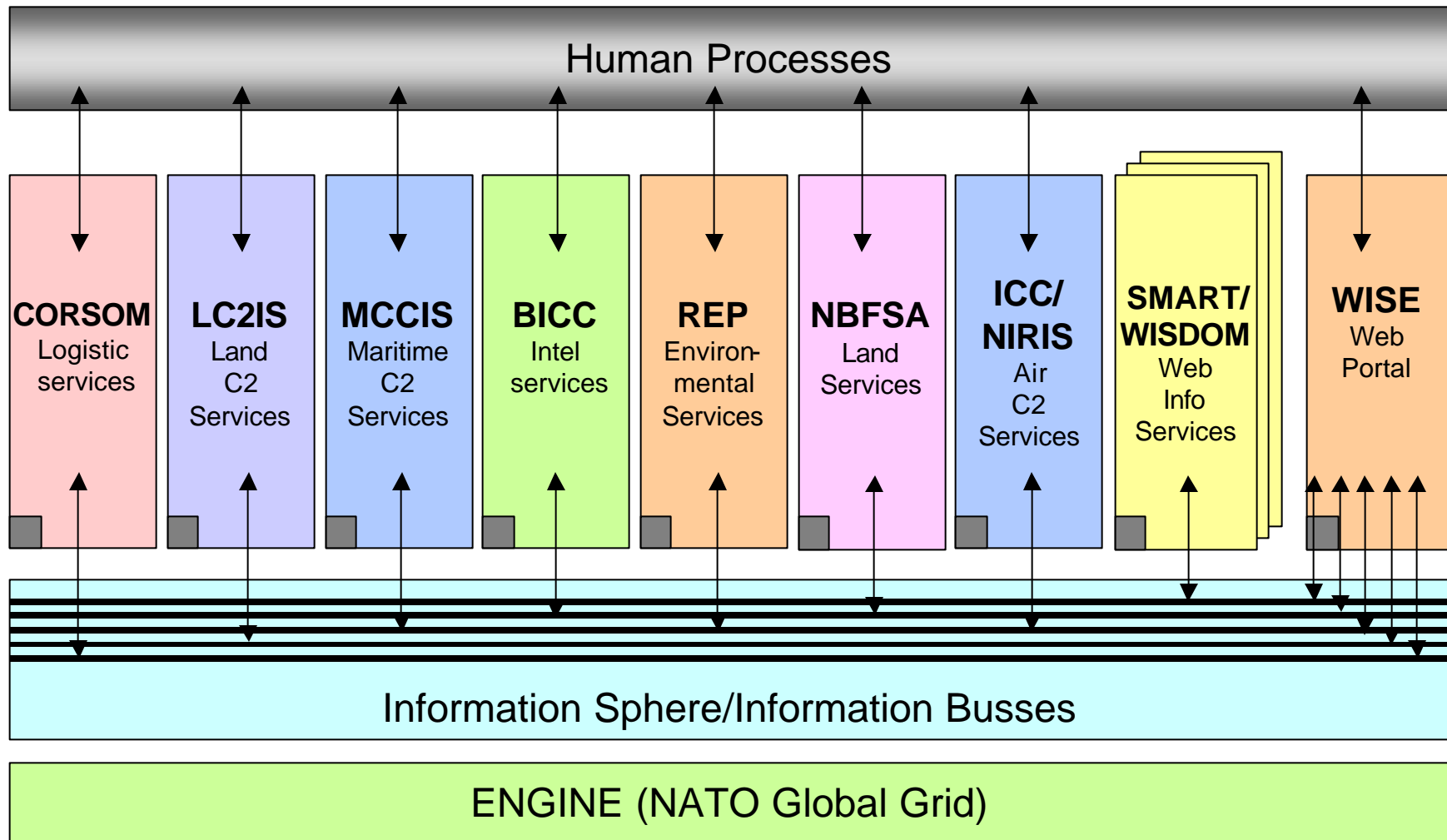
- **CORSOM**
 - Logistics services
- **LC2IS**
 - Land C2 services
- **MCCIS**
 - Maritime C2 services
- **ICC/NIRIS**
 - Air C2 Services
- **BICC**
 - Intel services
- **NBFSA**
 - Land friendly force tracking services


- **REP**
 - Environmental services
- **SMART / WISDOM**
 - Information management services
- **WISE**
 - Web portal Services

■ **The Information**

- Units
- Organizations
- Facilities
- Events
- Persons

Improved SA/COP at CWID 2005



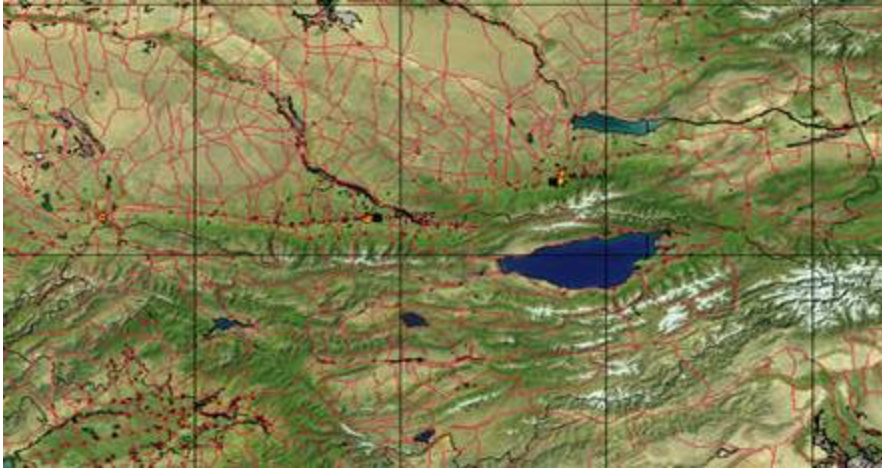
 Automatic discovery add-ons

Technologies Used

- Automatic Service Discovery
 - Apple Rendezvous protocol
 - Serverless peer-to-peer discovery
 - Also known as “zeroconf” protocols
 - Open source solution available for C, C++, Java, Python, ...
- Automatic Integration
 - OpenGIS consortium standards
 - Web Map Server (WMS)
 - Web Feature Server (WFS)
 - Web services (SOAP)
 - NATO experimental standard
 - Overlays with MIL-STD-252Bb or APP-6a military symbology
- Automatic information discovery and linking
 - Semantic web (RDF, Dublin Core, Taxonomies, MIP)
 - NATO experimental RDF query standard

Improved SA/COP Examples

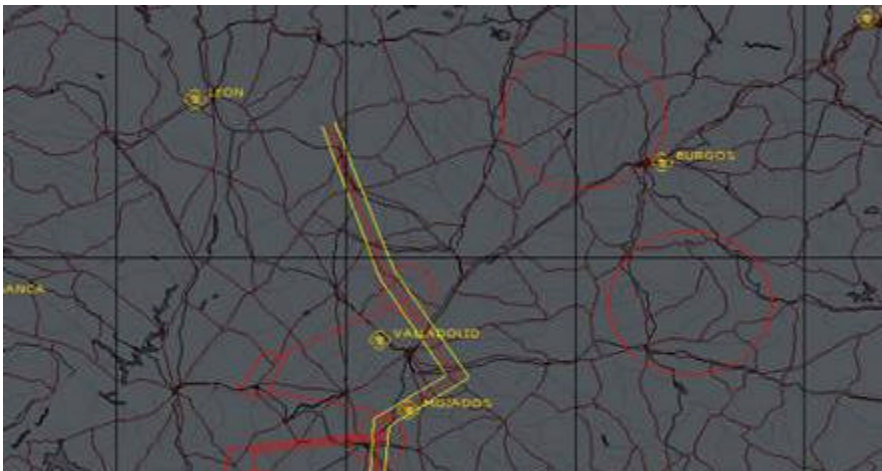
- The following set of slides show examples of improved SA and COP
- Information layers from numerous legacy and emerging capabilities are combined in a single view
- Most examples are taken from the WISE web portal but could have been taken from other systems such as MCCIS, ICC or LC2IS
- Chosen layers are only examples since information managers can automatically discover available layers and add them to their information views



Blue Marble (NASA image from web map server) +
VMAP0 (NGA vector maps from web map server)



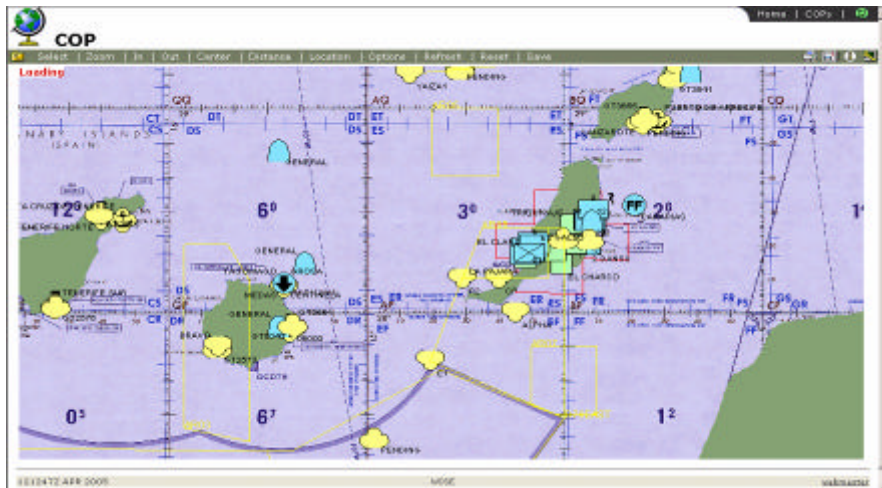
Blue Marble (NASA image from web map server) +
Global cloud layer (from web map server) +
Transparent day night layer



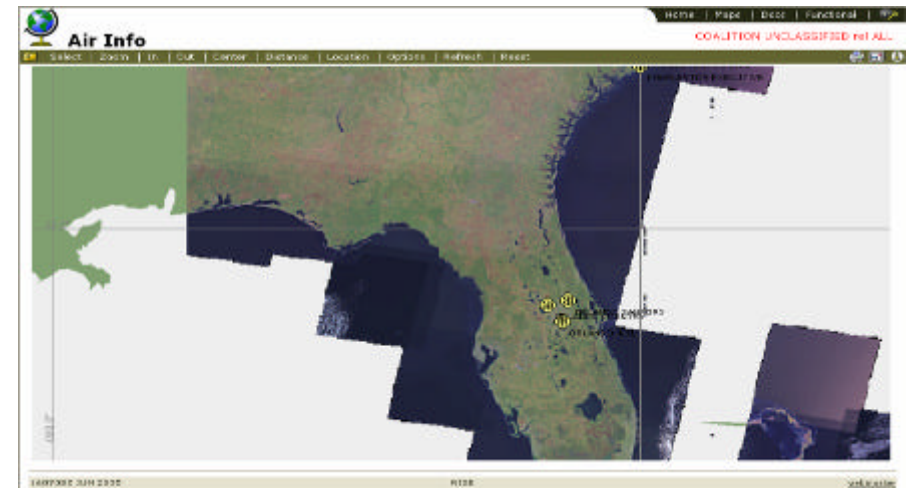
VMAP0 (from web map server) +
ACO (from ICC)



CIB (NGA imagery from web map server) +
DAFIF (airfield reference DB from MCCIS)



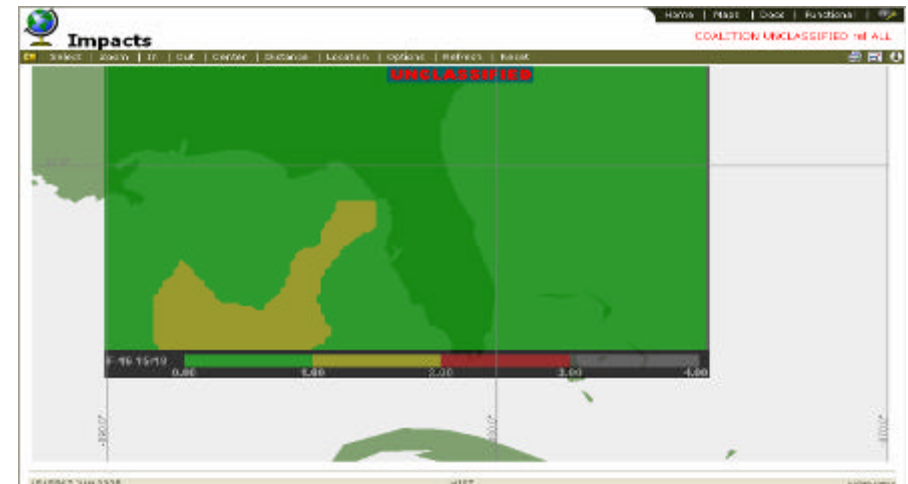
CADRG (NGA raster from web map server) +
RMP (from MCCIS) + RGP (from LC2IS) +
RAP (from NIRIS)



NGA vector map (from web map server) +
Landsat 7 (imagery from TIDE-REP) +
DAFIF (airfield reference DB from MCCIS)

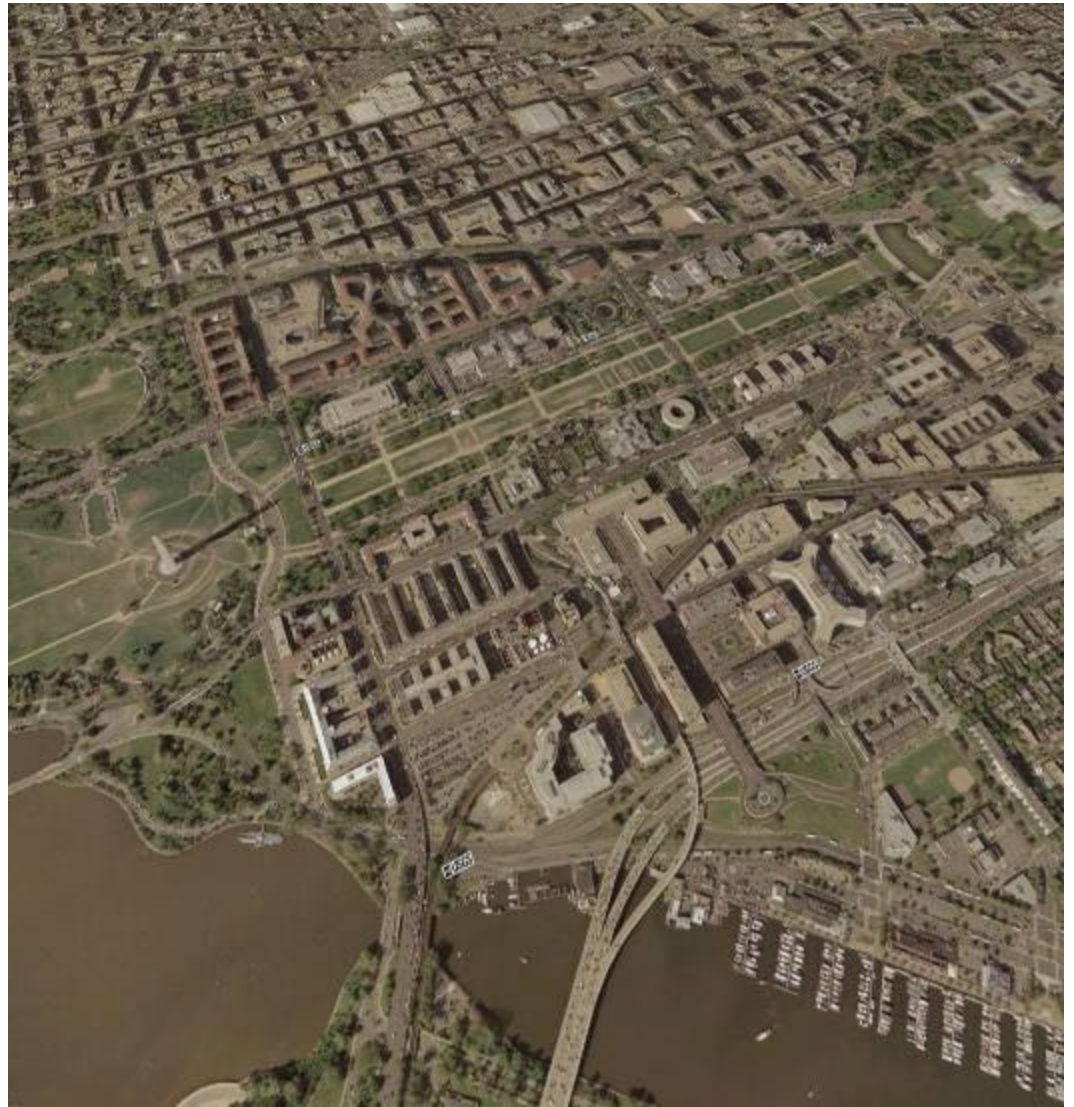


CADRG (NGA raster from web map server) +
RGP (from LC2IS)



NGA vector map (from web map server) +
Environmental prediction (from TIDE-REP)

Enhanced 3D Visualization



Information Discovery & Linking

- Operators will be able to automatically discover joint and combined information across many systems and domains
- Operators can link between structured (e.g. databases) and unstructured information (e.g. text documents, briefings, voice, video)
- The system automatically discovers semantic relationships between information and information sources based on information content and metadata
- Operators can also create manual relationships between information and information sources
- The next set of pages are just a few examples covering simply semantic notions. In theory, any information relationship can be discovered and explored

-
- The screenshot shows the Discovery application interface. At the top, there is a navigation bar with tabs for Home, News, and Search. Below this, a search bar contains the text "COALITION UNCLASSIFIED RE ALL". The main content area is titled "Person Results" and displays a table with columns for Source ID, Title ID, Description ID, and Location ID. The table lists various individuals, including Ayman El Zawahiri, Osama Bin Laden, BRADIC, RADOVAN, MILIC, STUBODAN, ZAKOVIC, PAVIC, RADOVIC, JAKOVIC, KROVAC, MICE, DINDAK, PAVIC, PRECUP, VUKO, BOLIC, CUBIC, SPASIC, GORDAN, KANIC, JAKOVIC, PRECUP, MICE, JAKOVIC, TUDIC, PAVIC, KROVAC, JAKOVIC, MICE, and PRECUP. A red diagonal line is drawn across the table, and a red vertical line is drawn next to the "Description ID" column header.
- | Source ID | Title ID | Description ID | Location ID |
|-------------------|---|----------------|--------------|
| Ayman El Zawahiri | | | |
| Osama Bin Laden | | | |
| BRADIC, RADOVAN | | | 43239 01349E |
| MILIC, STUBODAN | No military service. | | 43239 01349E |
| ZAKOVIC, PAVIC | | | 43239 01349E |
| RADOVIC, JAKOVIC | | | 43239 01349E |
| KROVAC, MICE | | | 43239 01349E |
| DINDAK, PAVIC | | | 43239 01349E |
| PRECUP, VUKO | | | 43239 01349E |
| BOLIC, CUBIC | | | 43239 01349E |
| SPASIC, GORDAN | Witnessed at a violent demonstration at a police station, not detained. | | 43239 01349E |
| KANIC, JAKOVIC | | | 43239 01349E |
| PRECUP, MICE | | | 43239 01349E |
| JAKOVIC, TUDIC | | | 43239 01349E |
| PAVIC, KROVAC | | | 43239 01349E |
| JAKOVIC, MICE | | | 43239 01349E |
| PRECUP, VUKO | Seen driving heavily and heavily in a truck as a local politician. | | 43239 01349E |

Status as of: 03/10/2003, 4320226N01747064E	
Last Known Location	4320226N01747064E Bosnia and Hercegovina
Comments	Witnessed at a violent demonstration at a police station. Not detained.
Nationality	Allegiance
Height	cm
Weight	kg
Marital Status	Marital Status
No. Children	No. Children
Ethnic Group	Ethnic Group
Grade	Grade
Service	Service
Profession	Profession
Specialization	
Promotion	
E. Service	
Personnel	

ObjectItem	
Name	Usama Bin Laden
Alt ID	Null
Birth Date	Null
Blood Type	NullValue
Ethnic Group	NullValue
Gender	NullValue
Religion	NullValue

ObjectType	
Type Name	Terrorist
Dummy Indicator	No

Information Discovery and Linking Example

1. You want to discover information about facilities. (This query could also have been started from any application that implements the RDF discovery protocol but in this case the examples are again from the WISE web portal).
2. A collection of information providers answer the query and since the question wasn't very specific, the answers are very diverse.
3. Operators can now drill down into the data sources like BICC and World Port Index on MCCIS.

World Port Index BARBERS POINT TERMINAL-CHEVRON	2116N 15806W
World Port Index HONOLULU	2118N 15752W
World Port Index PORT ALLEN	0104N 10930W
World Port Index HAWAII KOLI BAY	2102N 15821W
World Port Index AHIKUNA LANDING	2200N 15920W
World Port Index HONOLULU	2102N 15814W
World Port Index TERN ISLAND	2252N 15617W
Birnie Hospital	
Calver's Hospital	
Golden Gate Bridge	
BANDA LUNA Air Defense Site	Near BANDA LUNA Airport.
Civil Police Station #4	This is the third alternate civil police station for Mosier.
Airfield #4	
big Workshop	Suspected child labour workshop. Searded man in red suit observed administering short, green-suited labours to produce huge number of Tickle Me Elmos on unregulated dead-end. Also originating point of vehicle known to make unauthorized overruns of large portions of Europe and North America. Vehicle reportedly dangled bag of coal at the US White House.
PIROT Field Training Area	The artillery training area is adjacent to a barracks. The training area is approximately 600 hectares in size.
OSDOL POL Storage Facility	POL storage facility for Croatian military.
100 POL Storage Facility	Large POL storage facility for Serbian military.
SKOPJE Airfield	Civilian Airport.
KUKES Barracks	10-hectare barracks in outskirts of Kukes.
222 Dummy Plane	
PRISTINA Airfield	Civilian runway occasionally used for military purposes.
Airfield #1	An older airfield consisting of one cement runway.

Ports

Search: 1 Countries Index: 1 Search Results

Port Name: HONOLULU
Country: United States

Port Location: Harbor Details: Quarantine Details: Load & Offload: Port Services: Port Supplies: Repair Facilities

Port Location

Identifier
Index No. 56280
Region HAWAIIAN ISLANDS
Position 2118N 15752W

Port Map

Port Publication Data
Port Description: CPD
Reference Chart: 12367

1507802 JUN 2005

More... | Print | Close Window

Identification

Page 1 of 1

Name	SKOPJE Airfield	AD
Category	100	MD
Type	10003	Elev 200
Location	4157241N02137146E	MIR
Map Sheet		
Aliases		
Description	Civilian Airport	

Status as of: 26/05/2003, Operational

Activity	Main Operating Base	Report ID
Condition		Releasable
Op. Status	Operational	Updater
Allegiance	Multi-National	Update Time
Comments		

Report 1 of 1

34

- 
Ports

[Home](#) | [Maps](#) | [Data](#) | [Functional](#) | [Help](#)

[Search](#) | [Country Index](#) | [Search Results](#)

Port

Port Name HONOLULU

[Expand](#) | [Shrink](#) | [Reset](#)

Port Location

Harbor Details

Quarantine Details

Load & Offload

Port Services

Port Supplies

Repair Facilities

Port Location

Identifier	
Index No.	56280
Region	HAWAIIAN ISLANDS
Position	21.18N 157.52W

Port Map



[Back to Overview](#)
[Print Map](#)

Port Publication Data

Port Description	CRPT
Reference Chart	13367

180700Z JUN 2005

56280

56280



The screenshot shows the Discovery.com website. At the top, there is a navigation bar with links: Home, Maps, Cook, Functions, and a search icon. Below this, the text 'COMETION UNCLASSIFIED - d 4.1.' is visible. The main heading is 'Country Search'. Below the heading, it says 'Country Code: USA' and 'Facilities in this country:'. A table titled 'Results' is displayed, showing three entries:

Source ID	Title ID	Description ID
Flags - WISE	United States	The Flag of United-States-of-America
Flags - WISE	United States	
World Factbook - WISE	United States	

THE WORLD FACTBOOK




United States



[Click to enlarge](#)

CATEGORIES

- Introduction
- Geography
- People
- Government
- Economy
- Communications
- Transportation
- Military
- Transnational Issues

[Home](#)
[Reference](#)
[Maps](#)
[Appendices](#)
[Print-Friendly Page](#)

This page was last updated on 14 June, 2005



The map displays the United States with state boundaries and names. Major cities are marked with black dots and labeled, including Washington, D.C., New York, Los Angeles, San Francisco, Chicago, Houston, Phoenix, and many others. Surrounding countries like Canada and Mexico are shown in light green, and the Atlantic and Pacific Oceans are in light blue. A scale bar at the bottom indicates distances in miles and kilometers.

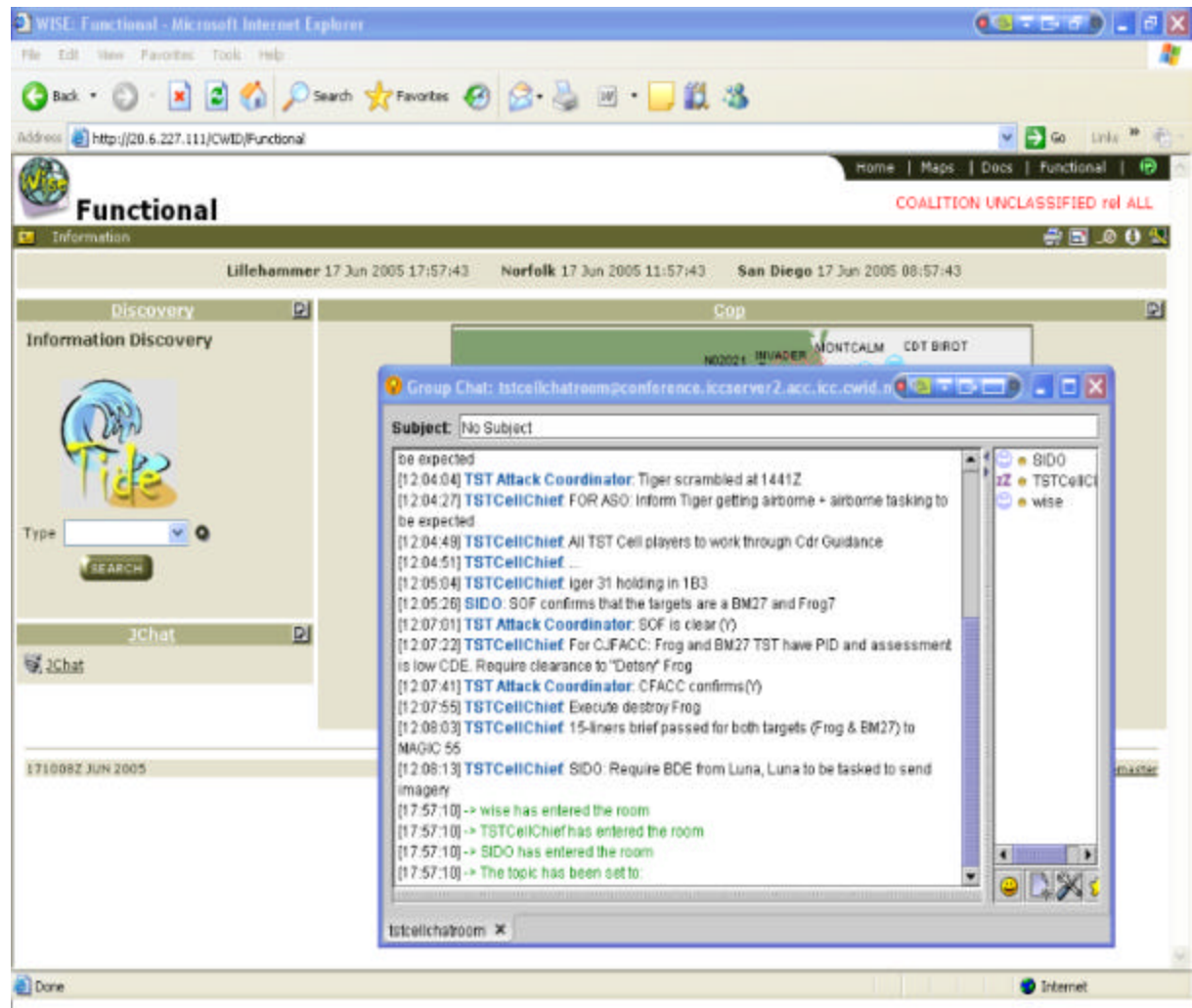
[illegible][illegible]

Hypothesis 3: Improved Collaboration

- For effective command & control, real-time human collaboration is essential
- For years, numerous telephony, radio and VTC capabilities have been used but cross domain computer-based collaboration such as chat, white-boarding, application sharing and desktop VTC have not matured sufficiently
- We can build computer based collaboration tools that will work seamlessly with command & control capacities to ensure that information management, information discovery and decision making can happen from the work space
- These tools should be support exchange of command & control information with the smallest amount of effort
- These tool shall support joint and combined activities across many system and domain boundaries

Real Time Collaboration

1. The COAC community is experimenting with a real-time chat capability embedded in ICC and therefore limited to ICC users.
2. In this example, the WISE web portal has been enhanced with a similar chat tool (based on the same protocol) and enables WISE users on local and remote networks to participate in the CAOC chat (assuming security requirements are met).

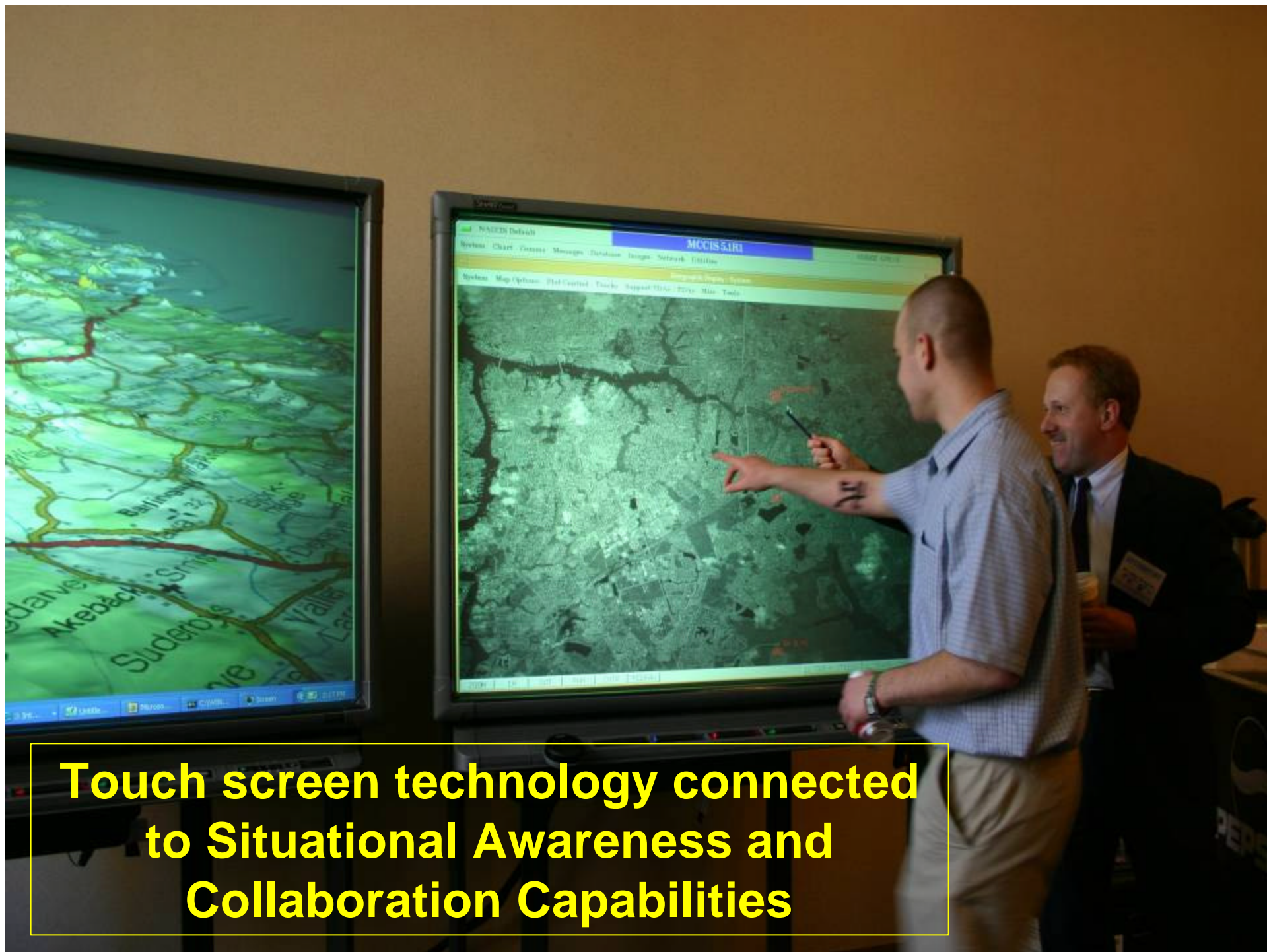


Hypothesis 4: Improved Visualization

- To support individual or group decision making in stressful environments, advanced visualizations are required to enable people to quickly gain mission space knowledge and understanding
- We can build solutions that improve human-to-human collaboration, information technology interaction and decision support
- These solutions must support mobile and static environments under “clean” and “harsh” conditions
- These solutions must support multi cultural, multi agency and multi security environments

Human Cognitive Experimentation

- Improve information visualization
 - What is the best way to visualize information to enable humans to gain knowledge and understanding quickly?
 - What is the best layout for certain types of information?
 - What is the right amount of information to make decisions?
- Improve capability ergonomics
 - How many clicks should it take to find the information you need?
 - What are the best human-machine-interface devices?
 - What is the best way to support information discovery and signal possible information linkages?



**Touch screen technology connected
to Situational Awareness and
Collaboration Capabilities**



Highly mobile solutions

(ATA case on wheels; remove cover, raise screen, deploy projector arm, connect to mobile IT rack and start command & control)



So what is the message?

- Forget about systems, ...
think components and services
- Forget about large scale acquisition, ...
think (r)evolutionary spiral development
- Forget about homogeneous solutions, ...
accept heterogeneity and demand
collaboration and cooperation with partners
- Be flexible and really think outside the box, ...
our opponents certainly are
- Don't just focus on technology issues, ...
most of our problems are of a human nature